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A Systems view of teaching and learning: technological potential and sustainable, supported open learning

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1. Introduction - teaching and learning

The central theme of this paper is the current interest amongst educational institutions in moving from teaching to learning as their main paradigm and the implications which technology media have for unravelling the debate and influencing the resulting practice (for example see Active Learning: Using the Internet for Teaching, Number 2, July, 1995). A second theme is how we use language, metaphor and models to describe systems for teaching and learning and what is the role of technology in relation to these systems and vice versa. The final theme is that of moving from an analysis of individual technologies to a synthesis of the educational ideas into a sustainable system. The movement towards learning and away from teaching is consistent with some of the longstanding traditions of education, particularly involving adults. Interestingly, this educational model should be conducive to the needs of students who are largely self-motivating and self-selecting in their absorption of educational products - a potential definition of the United Kingdom Open University student¹. The models set out in this section will be used as points of reference and comparison in the sections which follow. We will also develop our analysis in the light of three 'virtuous goals for education' - connectivity, co-operation, and creativity.

2. Conventional teaching

By the conventional paradigm for teaching we mean the traditional face to face teaching system. In terms of a systems view, conventional teaching can be seen as a series of discrete, hierarchically arranged sub-systems with a linear view of knowledge transfer from teacher to student. This is of course a generalisation but it is instructive in typifying the benefits and problems arising:

- Core benefits ~ the system can be seen as being 'humanised' with potential for close co-operation between teacher and student, support staff and student, student and student, etc. If properly designed, this multiple relationship or 'multiplex' system provides an excellent environment for effective feedback and support through monitoring, evaluation and assessment (Bell and Lane 1996).
- Core problems ~ The system is idiosyncratic, being highly dependent upon individual 'style'. This extends to such issues as variability and quality of content, regular changes dependent upon the vagaries of individual lecturer's preferences, the ephemeral aspects of some courseware, and students becoming reliant on the teacher's views.

¹ In fact this is remarkably in line with the sentiments of the Open University's first Chancellor, Lord Crowther, who said that the OU is :

Open as to people
Open as to places
Open as to methods and
Open as to ideas.

To finish this section we would like to suggest some metaphors to express the nature of the conventional teaching paradigm. We make use of metaphors here in order to provide images which offer humour and insight. The main value for them in the context of this paper is to make comparison with other educational systems. In developing our metaphoric comparison we consider the conventional education system against our three ‘virtuous goals for education’ ~ connectivity, co-operation, and creativity.

Table 1. Three Cs and metaphors in conventional education

Three Cs	Metaphors for the conventional education system
Connectivity	The Dorset countryside of patchwork fields (Variable, sustainable and interesting but lacking the machine efficiencies of the level landscapes of, for example, East Anglia).
Co-operation	The Pink Panther (A loner, brilliant but by good fortune, constantly on the verge of chaos)
Creativity	The ‘art and crafts’ movement in architecture. Middle class, middle England. Vernacular, homely and based upon a long-standing tradition.

3. The distance teaching model

The distance teaching model is characterised by the production and delivery of specially designed courseware, particularly print materials. This material encapsulates the knowledge of the teacher into a (hopefully) accessible format for the learner. A systems view of this distance model also shows a series of discrete sub-systems, but arranged sequentially rather than hierarchically in terms of the communications and relationships between the participants.

- Core benefits ~ the system is not dependent upon individual style. There is non-variability of content and reduced problems of ephemeral materials as courses are produced to an ‘industrial standard’ and open to wider scrutiny and ‘market testing’.
- Core problems ~ sometimes distance can be de-humanising in this system, with little room for co-operation between teacher and student, the two sides of the learning system or between student and student in a collegiate or community sense with the relationship between the greater number of participants being largely single interest ones; and there is a poor environment for feedback and joint learning due to severe time delays (Bell and Lane 1996).

Again, we have suggested some metaphors to describe the distance teaching model of education set against our 3 C’s.

Table 2. Three Cs and metaphors in distance education

Three Cs	Metaphors for the distance education system
Connectivity	Kansas wheat prairie. Highly connected in terms of technologies and ownership but lacking diversity and ecological richness
Co-operation	Chinese cultural revolution. Massive and obvious co-operation but enforced by systems of control which were too inflexible to allow individuality.
Creativity	Model T Ford. Creative inspiration in design but trapped in a treadmill production process

4. Need for supported open learning

The Open University has always tried to maximise the support to its students and prefers to use the term ‘supported open learning’ rather than ‘distance teaching’ (Rumble 1989).

Even so the scope for direct support between participants is limited while it is usually a single interest relationship. The Open University is therefore seeking to develop this 'supported open learning' and so move the distance teaching paradigm into a new era. Indeed we are seeking to make technologies the media whereby we can move on the educational debate and draw out the strengths of the two models we have discussed in overview so far. The authors believe that in the convergence of the two models we will find the emergence of themes for a new paradigm of supported open learning. Such a convergence, facilitated by technology, might provide higher education with advantages through linked benefits whilst avoiding the potential for the two sets of problems. To return to the analysis using extreme metaphors that we developed in sections 2 and 3, in this section we want to move on to synthesis. We developed these extremes from anecdote and common experience. The purpose of the current section is to develop the notions of combined virtues and achievable educational benefits. Taken in this format the two sets of metaphors can be seen as depicting extremes and generally un-likeable views if related to the process of higher education. Table 3 attempts to find the point of synthesis by drawing out the evident questions if we try to put the two models together:

Table 3. A model of convergence?

Three Cs	The convergence model
Connectivity	Sustainable via diversity of participants and use of technology to increase relationships?
Co-operation	Industrial levels of material of a standard quality delivered in an individualistic and personal manner?
Creativity	Familiar but challenging, unthreatening but dynamic?

5. Technology and supported learning

In this section we put some technological flesh on the theoretic bones for supported open learning set out in section 4. Our focus is on the word 'supported', in fact possibly the best phrase is 'media-supported'. In discussing media we refer to at least three forms:

- Connective, electronic media working over a distance (phones, fax, Internet and e-mail).
- Co-operative, work-share media (groupware such as Lotus notes but also linked suites of software such as Microsoft Word running via Microsoft Mail on Internet).
- Creative media (multi-media tools such as Macromind Director).

The core of the three and the most vital aspect is the electronic, communications medium. It is via this medium that the others come into effective use. We focus on this medium in what follows. When addressing the issue of distance media, the current centre of interest in Internet products is the World Wide Web (WWW). Sangster (1995) has argued:

'WWW has the potential to alter permanently the way in which academics teach and students learn', (p. 7).

Although Sangster adds little to demonstrate how this is possible, Pickering (1995) has added a useful critique. Relating his thinking primarily to Illich's (1970) notions concerning the need to deschool society², he develops two models of learning which

² Pickering sets this out as meaning "In Deschooling Society Ivan Illich sought to expose the oppressive side of formal education as it had come to function in the context of the developed nations of the west around the 1960s. He felt that with the technological resources education

conform in a generalisable manner to those which we have set out as being ‘conventional’ and ‘supported open learning’. In conventional terms Pickering reviews the learning process as having four features:

- Those to be educated ~ generally speaking the young.
- Those who educate ~ generally speaking older people.
- Skills and knowledge itself.
- Practices that facilitate learning and the achievement of educational objectives.

In the educational paradigm Pickering offers, these fourfold principles can be reformulated as follows:

- Who are to be educated? This question envisages a response which is broadening from the young to the old.
- Who will educate? The response which Pickering comes up with is the ‘Internetuals’ (p. 10). These are informal groups of teachers/ learners ‘fellow browsers in the cybernetic library’. (p.10), the co-learners.
- Skills and knowledge. Pickering argues that the ‘net-base’ will be the curriculum to be organised by the learner.
- Practices that facilitate learning and the achievement of educational objectives. With distance learning media there is no going to school ~ the net is the library and the classroom.

In de-schooling society great freedoms are possible and Pickering does go on to set a counter argument in which it can be argued that this utopian model might just apply to white, male, individuals in the west. Of course we are only in the early stages of understanding the barriers involved in the use of the Internet ~ from getting lost to cultural, geographic and economic boundaries to learning.

Building on the positive aspects of Pickering’s thinking, the single feature of greatest importance to the authors is the potential empowerment of the learner to develop multiple relationships between co-learners (students, tutors and academics) beyond individual courses, programmes, faculties and disciplines. With so much of the worlds information already in a digital format and with access to distance media, technology invites research collaboration and ‘the nomadic workplace’, where place of work is not of importance but, critically, working relationships are. This is a point also made strongly by Brown and Duguid (1996), where they argue that a university environment should:

- ‘• Enable students to engage in open learning, exploration and knowledge creation.
- Simultaneously, to provide the resources to help them work in both distal and local communities.
- Offer them the means to earn exchangeable, equivalent credentials for work done in class, on-line, or through hand-on experience’

How does the challenge of the Brown and Duguid vision relate to the questions set out in Table 3? The first question was:

Sustainable via diversity and technology? This was specifically related to the matter of connectivity. In our supported open learning model we are seeking to make effective use of the Internet facilities to bring learners and teachers together. Current experience at the Open University is reflected in the development of the technology course T102 *Living*

could become learning rather than teaching. The resources he required but could not find at that time were very much like what the Internet either does or may very soon come to offer”. P. 9.

with Technology where the FirstClass electronic mail system is being used by over 4,000 students.

The second question was:

Industrial levels of quality standard delivered in an individualistic and personal manner? Related to co-operation, this question is approached in terms of the responsiveness of the learning system to provide a high quality educational product where (at a location of the student's choice), when (providing flexibility over the time of study) and in (the media format) which is most accessible to the learner. These have been long-term policy goals of the Open University since its foundation (see Footnote 1). Technology facilitation means that the University is trying to improve the 'personal' approach via a range of strategies, e.g. course T102 providing student with modem access to conferencing and mail systems; course THD204 *IT and Society*, providing CD ROMS of library material as well as conferencing and mail systems; the Knowledge Media Institute at the Open University working on the 'Virtual Summer School'. All these items help the student to enter the multiple interest relationships evident within a conventional University atmosphere and collegiate culture whilst remaining in their homes.

The third question was:

Familiar and challenging, unthreatening and dynamic? This arose most specifically in the context of creativity. True multimedia in terms of learning material delivery is linked here to effective student practice with an emphasis on a community of learners supporting each other. In this sense the individual creativity of the teacher is rapidly and directly involved with students rather than being once or twice removed and delayed. Developments in terms of the Open University's electronic conferencing systems again provide opportunities for this question to be responded to effectively (Jennison 1996).

An aspect of the system which we have not yet discussed is that of contemplative reflection (the fourth C). Contemplative reflection on the impact of such technologies and systems on learning processes provides the authors with an interesting comparison with the consumerist (a negative C?) view of educational products with little thought of impact on learning which characterises much of educational planning. The aim of this paper has been to stimulate some of that contemplative reflection.

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